Logix

FAMILY FUN

T.E.A.M.M.A.T.E.*

GAME COMPUTER

*Total Electronic Advanced Microprocessing Maneuvers And Tactics Equipment

T.E.A.M.M.A.T.E.
GAME COMPUTER

INSTRUCTION AND OPERATION MANUAL

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Published by
LOGIX ENTERPRISES LTD.
3810 St. Patrick Street
Montreal, Quebec H4E 1A4

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2nd Edition 1978
PRINTED IN CANADA

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PREPARING YOUR GAME COMPUTER

1. DECALS

Find the decal sheet, separate the individual decals and affix them to the keyboard buttons in the order shown in the figure. Make sure the order is correct.

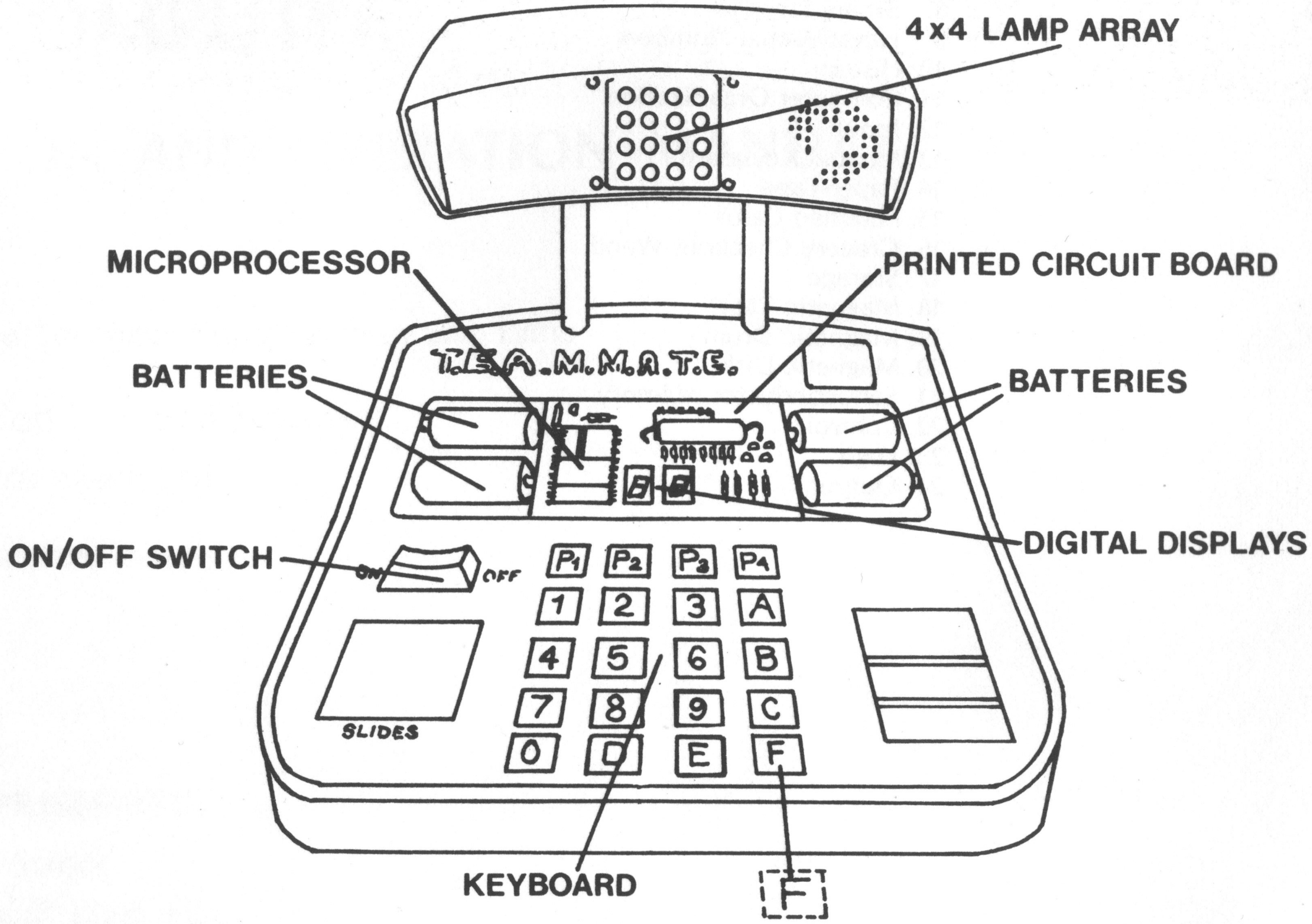
—WARNING—

THIS GAME COMPUTER CONTAINS ELECTRONIC PARTS WHICH MAY BE DAMAGED BY STATIC ELECTRICITY. DO NOT TOUCH OR HANDLE ANY PARTS ON THE PRINTED CIRCUIT BOARD.

2. BATTERIES

Locate the compartment for the 4 batteries and note the direction as shown. Switch the ON OFF switch to OFF. Remove the acrylic cover and insert the batteries in the correct direction. Use only D size alkaline batteries.

Recommended Batteries:
Mallory MN 1300
Eveready E-95
Ray-O-Vac 813



CONSTRUCTION

Your T.E.A.M.M.A.T.E. Game Computer comes completely assembled except where necessary for packaging reasons. Once the head piece and main console are removed from the corrugated box, you do as follows:

1) lift the acrylic cover to find 4 half legs in the battery compartment.

2) take two half legs, closing them together around one set of wires leading from the main console.

3) slide the legs into the main console with the bend in the legs at the top.

4) place the head piece on the top of the bent section of the leg.

5) repeat for other leg

6) your machine is now ready, and should resemble the figure.

Programmable Games

PART I T.E.A.M.M.A.T.E.

PREFACE

Welcome to the marvelous up-to-date world of the microprocessor. This tiny electronic marvel has led to the development of hundreds of thousands of calculators, video games and to your very own T.E.A.M.M.A.T.E. Game Computer. But unlike video games that require a TV screen to function and calculators that have limited capabilities, this game computer is totally self-contained and may be carried with you wherever you go.

The following section will introduce you to the different components of the Game Computer and explain in detail its functions.

THE KEYBOARD

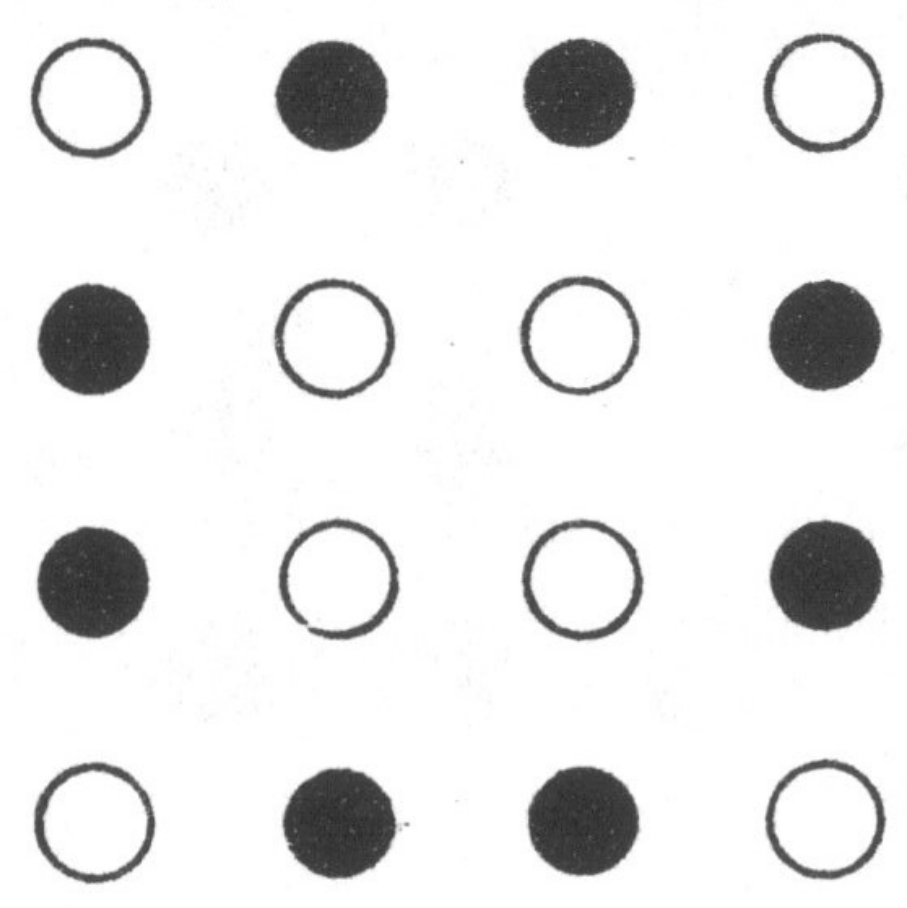
The keyboard is made up of 2 types of keys. The functional keys are P1, P2, P3, and P4. Their function is to start, stop, speed up, slow down, clear, etc. The rest of the keys labelled 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F correspond to the 4x4 matrix of lamps on the display. In addition, when these keys are used to call out a specific program from the computer's memory, their label is displayed alphanumerically on the digital display.

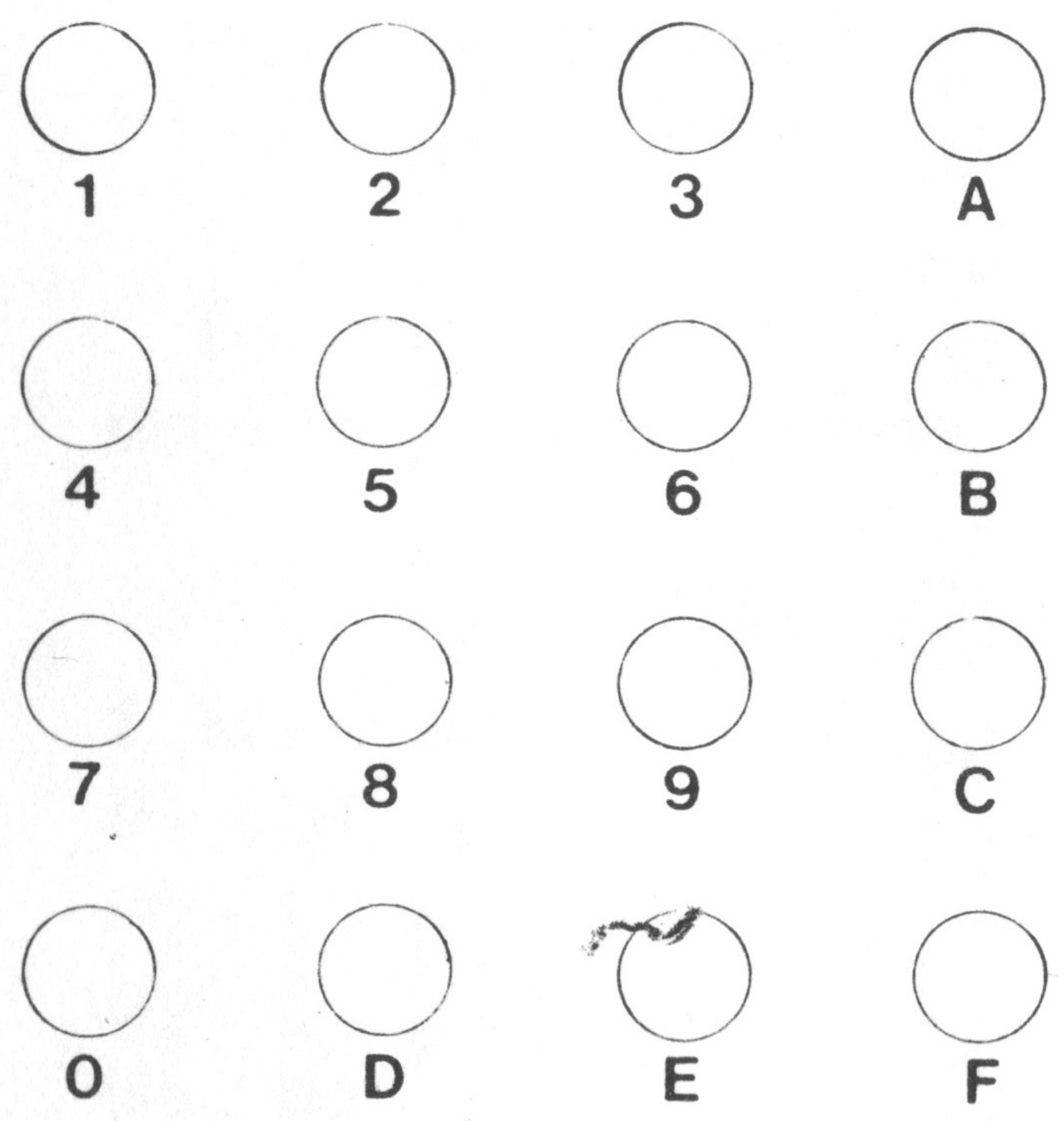
Let's examine in detail the instructions for a sample game. This will familiarise us with the keyboard and also check our construction. The instruction for the internal DOODLE PAD looks like this:
P3 - 81 - P1 - SPEED CODE - P1
Each of these terms will now be explained.

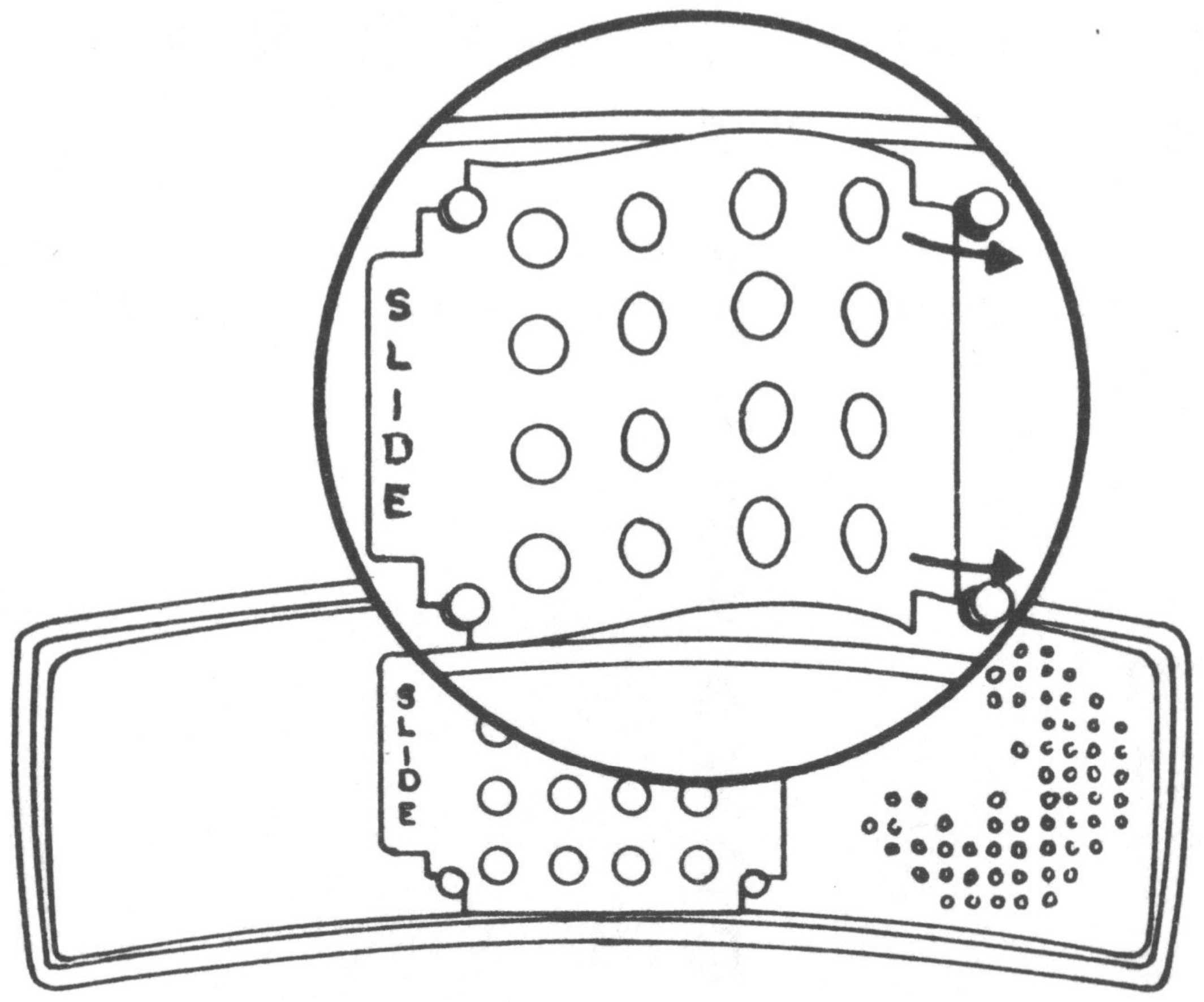
P3

Insert slide B as shown in figure 2.

Press the key marked P3, the 16 lamps should light up as in Figure 1. The 16 lamps correspond to the keyboard such that 1 is the lamp in the upper left hand corner, A is the lamp in the upper right hand corner, F is the lamp in the lower right hand corner, 0 is the lamp in the lower left hand corner and so on. Figure 2 shows the lamps and the keys that control them.







8 - 1

This is the code which tells the computer which game we want to play. As you press the key marked 8 and then the key marked 1 the counter on the left should read 8 and the counter on the right should read 1. Should you have any difficulty on your first try continue pressing 8 and then 1 until the counters read 8 and 1 in the **right** sequence. It is very important that the counters read right, otherwise the computer will call up the wrong game from its memory.

P1

When you press this key the code 8-1 is entered into the computer and the computer is now ready to display the internal pre-programmed DOODLE PAD. The reason that nothing happens is that the computer is waiting for one more bit of information. Can you guess what it is? Of course, it is the SPEED with which the frames of the doodle should be displayed.

SPEED

This term refers to a 2 - digit number made up of the keys from 0 to F. To understand how A, B, C, D, E or F are numbers we must very briefly explain how computers count. We will elaborate on this topic in Part II.

We count in a decimal system which has 10 distinct digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. For computers we use a **hexadecimal** system which has 16 digits called 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. The hexadecimal system compared to the decimal looks like this:

Decimal	Hexadecimal
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F
16	10
17	11
18	12
19	13
20	14
21	15
22	16
23	17
24	18
25	19
26	1A
27	1B
28	1C
29	1D
30	1E
31	1F
32	20
33	21
34	22
35	23
36	24
37	25
38	26
39	27
40	28
41	29
42	2A
43	2B
44	2C
45	2D
46	2E
47	2F
48	30
49	31
50	32
51	33
52	34
53	35
54	36
55	37
56	38
57	39
58	3A
59	3B
60	3C
61	3D
62	3E
63	3F
64	40
65	41
66	42
67	43
68	44
69	45
70	46
71	47
72	48
73	49
74	4A
75	4B
76	4C
77	4D
78	4E
79	4F
80	50

Etc.

Now, SPEED is a 2 digit hexadecimal number and whenever it is called for in an instruction for a game, set it as follows:-

FASTEST	MEDIUM	SLOWEST
0 0	5 6	F 1
0 1	5 7	F 2
0 2	6 6	F E
0 3	6 7	F F

In other words, for a SLOW SPEED pick a 2 digit number starting with E and F. For a medium SPEED pick a number with 5 or 6. For a very fast SPEED pick a number starting with 0 or 1.

Now press 6 and 6. The counters should display this SPEED. This will give you a speed of 66 as explained above. This speed is recommended for a first try. We will explain how to alter the speed as we proceed with the doodle game.

P1

This time P1 enters the SPEED into the computer and starts the game. The individual frames should look like this:-

Frame 1

○ ○ ○ ○
● ● ● ●
● ● ● ●
● ● ● ●

Frame 2

● ● ● ●
○ ○ ○ ○
● ● ● ●
● ● ● ●

Frame 3

● ● ● ●
● ● ● ●
○ ○ ○ ○
● ● ● ●

Frame 4

● ● ● ●
● ● ● ●
● ● ● ●
○ ○ ○ ○

Frame 5

● ● ● ○
● ● ● ○
● ● ● ○
● ● ● ○

Frame 6

● ● ○ ●
● ● ○ ●
● ● ○ ●
● ● ○ ●

Frame 7

● ○ ● ●
● ○ ● ●
● ○ ● ●
● ○ ● ●

ELECTRONIC DOODLE PAD [Internal]

Program Code — P3 - 81 - P1 - SPEED - P1

While the computer runs through the DOODLE PAD at the speed that you have set, you may change the speed by repeatedly pressing the functional keys P1 and P4. P1 will decrease the speed and P4 will increase the speed.

ELECTRONIC DOODLE PAD

Program Code — P3 - 04 - P1 - P2 Insert Slide A.

An electronic doodle, like a movie cartoon, is made up of a sequence of frames following one after another at a preset speed. To do this with your T.E.A.M.M.A.T.E. Computer you must design the picture in each frame and enter it into the computer's memory.

After entering the above code the counters should read 01 and all the lamps should be off. The counters count the frames by 01, 03, 05, 07, 09, 0B etc. If the counters show something other than 01, it can be brought back to 01 by pressing P4 the appropriate number of times. The first step in entering your doodle is to clear the lamps of any unwanted doodle. This is done by pressing P2. Now by pressing any or all of the keys from 1 to F, you can design your doodle. If you have made a mistake or are not satisfied with the outcome of the first frame, you may clear it by pressing P2, and then starting all over again. The counters show 01 and therefore you are still in Frame 1.

After you are satisfied with Frame 1, press P1. This puts your Frame 1 doodle into the computer's memory and proceeds to Frame 2. The counters will indicate 03 because it takes 2 lines of computer memory for each frame. Once again clear the memory with P2 and again doodle your pattern with the keys from 1 to F. Once you are satisfied with the second frame press P1, then clear the next frame by pressing P2 and proceed to doodle your Frame 3. Remember, the counters will show 05. After you have doodled your last frame press P1 - P2 - P1 or, in other words, enter a blank frame in the memory. The reason for this is to tell the computer that the previous frame is the last one.

If you wish to see your doodle one frame at a time, simply press P4 for reverse and P1 for forward. The frames will appear individually with their corresponding counter numbers 01, 03, 05, 07, etc.

To change the doodle pattern in any frame, call it up with P4 or P1, erase with P2, write in the new pattern and press P1.

Now you are ready to replay the doodles you have drawn. Press P3 - 02 - P1 - SPEED - P1

To speed up the frames, press P4 a number of times and to slow them down, press P1.

SOME SUGGESTED DOODLE

1. Starburst

P3 - 04 - P1
P2 - 5 - 6 - 8 - 9 - P1
P2 - 1 - 2 - 3 - A - B - C - D - E - F - 0 - 7 - 4 - P1
P2 - P1
P3 - 02 - P1 - 51 - P1

2. Spiral

P3 - 04 - P1
P2 - 0 - P1
P2 - D - P1
P2 - E - P1
P2 - F - P1
P2 - C - P1
P2 - B - P1
P2 - A - P1
P2 - 3 - P1
P2 - 2 - P1
P2 - 1 - P1
P2 - 4 - P1
P2 - 7 - P1
P2 - 8 - P1
P2 - 9 - P1
P2 - 6 - P1
P2 - 5 - P1
P2 - 8 - P1
P2 - P1
P3 - 02 - P1 - 56 - P1

3. Reverse Spiral

P3 - 04 - P1
P2 - 8 - P1
P2 - 5 - P1
P2 - 6 - P1
P2 - 9 - P1
P2 - 8 - P1
P2 - 7 - P1
P2 - 4 - P1
P2 - 1 - P1
P2 - 2 - P1
P2 - 3 - P1
P2 - A - P1
P2 - B - P1
P2 - C - P1
P2 - F - P1
P2 - E - P1
P2 - D - P1
P2 - 0 - P1
P2 - P1
P3 - 02 - P1 - 56 - P1

BATTLEFIELD

Insert Slide C.

Imagine that it is the year 2179 A.D. and it is your mission to detect and destroy your opponent's spaceship. Your opponent will enter into the computer the positions of his spaceship and he will then hide them from you. He will tell you how many spaceships there are and you will have to find their positions and destroy them. The computer will let you know by means of certain sounds whether your shot is a hit or a miss. In addition, to make it more of a challenge, you will be penalized according to a variable point system and you will lose if you still have not found the spaceships by the time the counters reach or exceed 90. To play, press P3 - 08 - P1.

The lamps are all off and the counters read 00. Without looking, have your opponent select, by means of keys 1 to F a number of spaceship positions. Any number up to 16 may be used, but 3 to 5 is preferable. Now, have him enter these positions into the computer and hide them from you by pressing P4.

It is now your turn to detect the hidden spaceships. To fire a shot, depress any of the keys 1 to F up to 3 and then press P4. The computer will announce a direct hit by means of a 2-tone sound BEEP-BEEP. If you have fired at one position you will lose no points, but if you fired at more than one you will lose 5 points.

If you fire at one position and miss, the computer will sound a single BEEP and you lose 15 points.

TRY		**SOUND**	**POINTS**
1 Position	Hit	BEEP-BEEP	0
1 Position	Miss	BEEP	15
2 or 3 Positions	Hit 1 or More	BEEP-BEEP	5
2 or 3 Positions	Miss	BEEP	10

If you fire at more than one position, but not more than 3, and miss, the computer will sound a single BEEP and penalize you 10 points. To fire again press P1 - Positions - P4. When you feel sure that you have found all the hidden spaceships, announce their positions to your opponent and note your score. Press P2 and the computer will show you the hidden spaceships. If you are wrong you lose automatically. If you are right, repeat the game, exchanging sides and keeping the same number of spaceships. The player with the lowest number of points after guessing the hidden positions wins.

Examples:-

Your opponent presses P3 - 08 - P1 and hides spaceships at 1, 5, and 9 by pressing 1 - 5 - 9 - P4. You fire a missile at the spaceship at position 1 by pressing 1 - P4.

The computer sounds BEEP-BEEP and the score remains 00. A direct hit! You try position 2 and 5. P1 - 2 - 5 - P4

The computer again sounds BEEP BEEP but the score changes to 05. There is a spaceship at 2 or at 5 or at both but you have lost 5 points because you tried two missiles.

You try position 2 alone P1 - 2 - P4.

The computer sounds a single BEEP and the score changes to 20. You have missed and lost 15 points, but you can now deduce that a spaceship must be at 5. You want to try P1 - B - C - F, but change your mind, so you press P1 - A - B - C - P4. The computer sounds a single BEEP and you lose 10 points. You now know that there is no spaceship at A or B or C and your total score is 30. You try 6 and 9 and E by pressing P1 - 6 - 9 - E - P4. A BEEP BEEP and 5 points to 35 indicates that 6 or 9 or E is the position of the last spaceship. You then try 6 and E by pressing P1 - 6 - E - P4. The computer sounds a single BEEP and the score changes by 10 to 45. Then 6 and E are both misses and 9 is the position of the last hidden spaceship. Then the spaceships must be at 1, 5 and 9. To verify, press P2 and your score is 45.

DICE

Do you want to throw some electronic dice? Press P3 - 0C - P1 - P1 and HOLD

When you release P1 the computer will generate 2 random numbers and display them on the counters just as if you would throw some real dice. To throw again push P1 and release. The numbers are never allowed to exceed 6 and they are completely random. Have fun! This program lets your TEAMMATE act as a pair of die to be used with all of your other games.

TIC-TAC-TOE

Insert slide D.

To play electronic TIC-TAC-TOE, designate a 3x3 array on the display, as, for example, 1, 2, 3, 4, 5, 6, 7, 8, 9, as the playing area. The player on the left will enter his X's by pressing P1 and any one of the 9 keys. The player on the right will enter his Y's by pressing P4 and any one of the remaining 8 positions. To differentiate between the 2 players on the display, the entries made by the right player will blink. To start, press P3 - 0D - P1

The counters show E0 meaning that the player on the left starts. He presses any one of the 9 selected keys and it remains lit. The player on the right now presses P4, and any other key. The counter shows 0E and his entry blinks. The player on the left now makes an entry by pressing P1 and another key. Play continues until one player makes 3 in a row or it ends in a draw. Note that to clear a move, simply press the same key again.

MUSIC

This computer has recently completed a course at the Juilliard School of Music, specialising in electronic music. To see what it has learnt, press P3 - 8E - P1

Not exactly Beethoven, but also not a bad feat for a hunk of silicon and some batteries.

WRITE YOUR OWN MUSIC

Insert slide E.

In order to make it easier to write and replay melodies from the computer we have developed a rather simplified method of musical notation, which goes as follows:

A musical melody can be thought of as a combination of notes and pauses of different durations. An easy way to understand this is to think of a pause as a note having no sound. Then we can write music by means of 2-digit numbers, where the second digit corresponds to a note or pause and the first digit is its duration. The list of notes and durations which your computer understands is shown in the table.

Let's take a closer look at the table and see what it all means. Notice that you can play all the notes including sharps in 2 full octaves, and every note has a unique hex symbol which the computer understands, C is 1, D is 2 etc., and a pause is 8. We will learn how to use these symbols later when we play real music.

Next, look at the column called DURATION. These symbols will determine how long each note or pause is played. For those

Durations - Digit 1	
1	Short
2	
3	
4	Medium
5	
6	
7	Long

Notes - Digit 2	
C	1
D	2
E	3
F	4
G	5
A	6
B	7
Pause	8
c	9
d	A
e	B
f	C
g	D
a	E
b	F

9	Short
A	
B	
C	Medium
D	
E	
F	Long

C#	1
D#	2
F#	4
G#	5
A#	6
c#	9
d#	A
f#	C
g#	D
a#	E

DURATION RATIOS

1	1
2	2
3	4
4	6
5	8
6	12
7	16

familiar with music, if you call the Duration symbol 3 half notes, then 2 is quarter notes, 1 is eighths, 5 is whole notes and 7 is 2 whole notes.

To play the sharps in these 2 octaves we use a different DURATION symbol. Thus the note F for a DURATION of 3 is 3-4. The note F#for the same DURATION is B-4. Similarly, the note G for a DURATION of 2 is 2-5 and G# for the same DURATION is A-5. The other table shows the time ratios for the DURATION symbols as well as how they would look in musical notation.

Let's see if we can play a simple melody by using the rules we have learned. First, press P3 - 03 - P1. This tells the computer that we want to write in some music. Then press 4 - 1 which means the note C for a duration of 4. Note the order, first the duration then the note. To enter the note into the computer press P1. Now, enter the next note, D at a DURATION of 4. Press:-
42 - P1 (D)

continue using the following list
43 - P1 (E)
41 - P1 (C)
41 - P1 (C)
42 - P1 (D)
43 - P1 (E)
41 - P1 (C)

To tell the computer that the song is finished and that it should repeat from the beginning, press

00 - P1

Before we listen to the melody we have entered, let's see if the notes have been entered properly. To see the notes and their durations press P4 for reverse and P1 for forward and you should be able to see the sequence of notes you have entered. If you want to change a note or its duration, simply press P1 or P4 until it appears, then write the new symbol in and press P1.

To listen to the song you have entered press

P3 - 05 - P1

Let's try some simple exercises to become familiar with the ideas we just learned. But first, here are some basic rules:-

1) The Program Code for writing in music is 03.
2) The Program Code for playing back music is 05.
3) To enter a note or pause and advance to the next note use P1
4) To back up and see the notes you wrote, use P4.
5) To write in a note use 2 digits. The first digit must be the duration symbol and the second is the note e.g. D with a duration of 4 is 4 - 2.

EXERCISE 1
We will enter the note C using different durations, separated by a pause. Press,

P3 - 03 - P1
11 - P1
48 - P1
21 - P1
48 - P1
31 - P1
48 - P1
41 - P1
48 - P1
51 - P1
48 - P1
61 - P1
48 - P1
71 - P1
00 - P1

Check this program by pressing P4 repeatedly until 11 appears, then press P1 to advance through the list. Correct any errors. Then, to play back what we have entered, press,

P3 - 05 - P1

Listen to it carefully to become familiar with the durations.

A word to the purists: Don't use a tuning fork or piano to see if our C is really a middle C. It is not. However, all the notes of the 2 octaves that you have are harmonically related to produce perfect intervals in the tempered scale.

EXERCISE 2
Now, we will play what the musicians call a scale of C major. Press,

```
P3 - 03 - P1
41 - P1        C
42 - P1        D
43 - P1        E
44 - P1        F
45 - P1        G
46 - P1        A
47 - P1        B
49 - P1        C
49 - P1        C
47 - P1        B
46 - P1        A
45 - P1        G
44 - P1        F
43 - P1        E
42 - P1        D
41 - P1        C
00 - P1        REPEAT
```

Check it using P4 and P1 and replay it by pressing

```
P3 - 05 - P1
```

This is the lazyman's way to practice scales.

EXERCISE 3

To become familiar with the way sharps are accommodated by your computer, let's play what the musicians call a chromatic scale. Press,

```
P3 - 03 - P1
41 - P1        C
C1 - P1        C#
42 - P1        D
C2 - P1        D#
43 - P1        E
44 - P1        F
C4 - P1        F#
45 - P1        G
C5 - P1        G#
46 - P1        A
C6 - P1        A#
47 - P1        B
49 - P1        C
00 - P1        REPEAT
```

Check and replay by pressing

```
P3 - 05 - P1
```

Notice that duration C in hex for sharps is the same as duration 4 for natural notes.

EXERCISE 4
A Familiar Melody

```
P3 - 03 - P1
39 - P1
39 - P1
3A - P1
3B - P1
39 - P1
3B - P1
3A - P1
35 - P1
39 - P1
39 - P1
3A - P1
3B - P1
59 - P1
37 - P1
35 - P1
39 - P1
39 - P1
3A - P1
3B - P1
3C - P1
3B - P1
3A - P1
39 - P1
37 - P1
35 - P1
36 - P1
37 - P1
59 - P1
59 - P1
00 - P1
P3 - 05 - P1
```

SUBROUTINING

You must have realized by now, that most melodies have parts that repeat and writing them all in can be quite tedious and long.

To help you do this easily and at the same time to progress to more advanced music, we have developed a special technique which we call subroutining. This allows us to take a group of notes which repeat throughout a melody, write them into the computer once and assign them to a certain location in the computer's memory. Since these locations, called addresses, are numbered, we can recall the whole group of notes simply by calling up the memory address. This will become clear as we rewrite the song in Exercise 4 using subroutining. But first, some more basic rules:

1) To write a subroutine starting at some Address, press P4 - C1 - Address (Hex)
2) Addresses are numbered in the hexadecimal system starting with 12.
3) The last address allocated for any song is 3E
4) To tell the computer that the subroutine is over, press C0 - P1

Let's see how we can rewrite the song in Exercise 4 using subroutining and at the same time learn how to write any song you want.

STEP 1

Find a piano, guitar or similar instrument, figure out the notes and write them down in sequence. For the song in Exercise 4 it looks like this:

9
9
A
B
9
B
A
5
9
9
A
B
9
7
5
9
9
A
B
C
B
A
9
7
5
6
7
9
9

STEP 2

If you don't want to use subroutining, simply add on the durations and P1 for each line, start with

P3 - 03 - P1

end with 00 - P1 and you're done. For subroutining, proceed to Step 3.

STEP 3

Find all the groups of notes or refrains which are repeated. For our case it is the group 9, 9, A, B, which is repeated 3 times. This group will be a subroutine.

Rewrite the list in Step 1 using the rules for subroutining outlined before. Leave the subroutine address blank for now. Number the whole list in hex starting with number 12. If you have forgotten how to count in hex find the table at the beginning of the manual. The list now looks like this:

12	C1
13	
14	9
15	B
16	A
17	5
18	C1
19	
1A	9
1B	7

```
1C   5
1D   C1
1E
1F   C
20   B
21   A
22   9
23   7
24   5
25   6
26   7
27   9
28   9
29   00
2A   9
2B   9
2C   A     Subroutine
2D   B
2E   C0
```

Notice that we have put the subroutine after the end of the song, and that we now know its address.

STEP 4

Finally fill in the durations for each note. An easy way to do this is to find notes or pauses with durations twice or 4 times the duration of one of the other notes. Then use the table of durations to determine the right numbers.

The final list looks like this:

```
P3 - 03 - P1
C1 - P1
2A - P1
39 - P1
3B - P1
3A - P1
35 - P1
C1 - P1
2A - P1
59 - P1
37 - P1
35 - P1
C1 - P1
2A - P1
3C - P1
3B - P1
3A - P1
39 - P1
37 - P1
35 - P1
36 - P1
37 - P1
59 - P1
59 - P1
00 - P1
39 - P1
39 - P1
3A - P1
3B - P1
C0 - P1
P3 - 05 - P1
```

STEP 5

It is always a good idea to check whether the music list has been properly entered into the computer. Do this by pressing P4 repeatedly until the first entry appears which in this case happens to be C1. Then check that each line is right by pressing P1 to advance. Correct any errors.

STEP 6

To listen to the song you have written, press

P3 - 05 - P1

THE T.E.A.M.M.A.T.E. SONG

Would you like to see the program that the computer has memorized in order to play its song? The program code is 8E. So press

P3 - 8E - P1

After playing it once or twice press

P3 - 03 - P1

and by repeatedly pressing P1 for forward and P4 for reverse the counters will run through the whole list. See if you can figure out the subroutines.

SOME EASY SONGS

The song we played above is permanently written into your T.E.A.M.M.A.T.E. Computer. We can, however, enter any song whose program we know.

Here are the programs for some popular songs which we have written for you. As you enter them into your T.E.A.M.M.A.T.E. Computer make sure that each line reads right on the counters before pressing P1. To check whether you have not missed any lines, back up by pressing P4 a number of times until the counters don't change even if you continue to press P4. The counters should now read your first line after the Program Code 03. Now by pressing P1 repeatedly you could check if all the lines were entered properly. Once you are satisfied, press

P3 - 05 - P1

to play the song. To stop, press P3 and to start again, press P1.

STAR SPANGLED BANNER

P3 - 03 - P1
35 - P1
33 - P1
41 - P1
43 - P1
45 - P1
69 - P1
3B - P1
3A - P1
49 - P1
43 - P1
C4 - P1
65 - P1
35 - P1
35 - P1
4B - P1
3B - P1
3A - P1
49 - P1
67 - P1
36 - P1
37 - P1
49 - P1
49 - P1
45 - P1
43 - P1
61 - P1
00 - P1
P3 - 05 - P1

STARS AND STRIPES FOREVER

P3 - 03 - P1
39 - P1
39 - P1
49 - P1
B6 - P1
36 - P1
46 - P1
B5 - P1
36 - P1
66 - P1
48 - P1
B5 - P1
36 - P1
46 - P1
B5 - P1
36 - P1
49 - P1
36 - P1
39 - P1
D6 - P1
45 - P1
48 - P1
45 - P1
B4 - P1
35 - P1
45 - P1
B4 - P1
35 - P1
D6 - P1
36 - P1
35 - P1
36 - P1
39 - P1
38 - P1
39 - P1
4A - P1
4A - P1
65 - P1
00 - P1
P3 - 05 - P1

THREE BLIND MICE

P3 - 03 - P1
C1 - P1
21 - P1
C1 - P1
21 - P1
C1 - P1
25 - P1
C1 - P1
25 - P1
C1 - P1
29 - P1
C1 - P1
29 - P1
C1 - P1
21 - P1
00 - P1
43 - P1
42 - P1
61 - P1
C0 - P1
45 - P1
44 - P1
63 - P1
C0 - P1
49 - P1
27 - P1
26 - P1
27 - P1
49 - P1
45 - P1
45 - P1
C0 - P1
P3 - 05 - P1

OH MY DARLING

P3 - 03 - P1
34 - P1
34 - P1
44 - P1
41 - P1
36 - P1
36 - P1
46 - P1
44 - P1
34 - P1
36 - P1
49 - P1
49 - P1
B6 - P1
36 - P1
55 - P1
35 - P1
36 - P1
C6 - P1
C6 - P1
36 - P1
35 - P1
46 - P1
44 - P1
34 - P1
36 - P1
45 - P1
41 - P1
33 - P1
35 - P1
74 - P1
00 - P1
P3 - 05 - P1

TAKE ME OUT TO THE BALL GAME

P3 - 03 - P1
41 - P1
39 - P1
36 - P1
35 - P1
33 - P1
45 - P1
35 - P1
42 - P1
32 - P1
41 - P1
39 - P1
36 - P1
35 - P1
33 - P1
65 - P1
45 - P1
36 - P1
B5 - P1
36 - P1
33 - P1
34 - P1
35 - P1
46 - P1
34 - P1
62 - P1
46 - P1
36 - P1
37 - P1
39 - P1
3A - P1
37 - P1
36 - P1
35 - P1
34 - P1
32 - P1
00 - P1
P3 - 05 - P1

BATTLE HYMN OF THE REPUBLIC

P3 - 03 - P1
C1 - P1
23 - P1
C1 - P1
23 - P1
C1 - P1
36 - P1
35 - P1
33 - P1
35 - P1
C1 - P1
36 - P1
35 - P1
35 - P1
35 - P1
C1 - P1
23 - P1
00 - P1
21 - P1
23 - P1
35 - P1
35 - P1
35 - P1
35 - P1
35 - P1
39 - P1
35 - P1
23 - P1
24 - P1
35 - P1
35 - P1
34 - P1
32 - P1
31 - P1
31 - P1
31 - P1
C0 - P1
29 - P1
27 - P1
36 - P1
34 - P1
36 - P1
39 - P1
C0 - P1
P3 - 0 - 5 - P1

YELLOW ROSE OF TEXAS

P3 - 03 - P1
25 - P1
24 - P1
33 - P1
35 - P1
35 - P1
35 - P1
36 - P1
35 - P1
38 - P1
25 - P1
24 - P1
33 - P1
35 - P1
39 - P1
3A - P1
6B - P1
35 - P1
35 - P1
3C - P1
3C - P1
3C - P1
3B - P1
3A - P1
39 - P1
39 - P1
35 - P1
3B - P1
3A - P1
69 - P1
00 - P1
P3 - 05 - P1

BRAHMS LULLABY

P3 - 03 - P1
43 - P1
43 - P1
65 - P1
45 - P1
43 - P1
63 - P1
65 - P1
65 - P1
43 - P1
45 - P1
69 - P1
67 - P1
66- P1
66 - P1
65 - P1
42 - P1
43 - P1
64 - P1
62 - P1
42 - P1
43 - P1
64 - P1
64 - P1
42 - P1
44 - P1
47 - P1
46 - P1
65 - P1
67 - P1
69 - P1
69 - P1
00 - P1
P3 - 05 - P1

JINGLE BELLS

P3 - 03 - P1
C1 - P1
22 - P1
37 - P1
36 - P1
36 - P1
37 - P1
46 - P1
4A - P1
C1 - P1
22 - P1
3A - P1
3A - P1
39 - P1
36 - P1
65 - P1
00 - P1
37 - P1
37 - P1
47 - P1
37 - P1
37 - P1
47 - P1
37 - P1
3A - P1
35 - P1
36 - P1
67 - P1
39 - P1
39 - P1
49 - P1
39 - P1
37 - P1
47 - P1
C0 - P1
P3 - 05 - P1

ENGLISH COUNTRY GARDEN

P3 - 03 - P1
C1 - P1
23 - P1
C1 - P1
23 - P1
C1 - P1
36 - P1
C1 - P1
36 - P1
49 - P1
39 - P1
37 - P1
46 - P1
4A - P1
67 - P1
26 - P1
75 - P1
00 - P1
49 - P1
39 - P1
37 - P1
46 - P1
46 - P1
45 - P1
35 - P1
34 - P1
43 - P1
33 - P1
34 - P1
45 - P1
41 - P1
42 - P1
44 - P1
63 - P1
22 - P1
71 - P1
C0 - P1
39 - P1
3A - P1
39 - P1
36 - P1
37 - P1
36 - P1
45 - P1
C0 - P1

NOTE: - If you want a faster speed, decrease all the durations by 1. eg.

P3 - 03 - P1
C1 - P1
22 - P1
27 - P1
26 - P1
27 - P1
etc.

BLEEP

P3 - 07 - P1 - SPEED CODE - P1

-P1 FOR SERVE FROM LEFT
-P4 FOR SERVE FROM RIGHT

Insert slide F.

The ball will appear on the server's side in one of the four positions. The player who serves now pushes one of the 4 keys corresponding to the 4 lamps on that side. The ball will start from the position selected and travel toward the other side in a random pattern selected by the computer and at a speed picked by you.

The receiver now must push the key of the position where he thinks the ball will land **before** the ball lands there. If he does, the ball will rebound and head back to the server's side. Play continues until someone defaults. A short BEEP will then be heard and the opponents' score will increase by 1.

The first player to reach 9 points, as shown by the numeric display,, wins the game and the display lights up all 8 positions to show GAME OVER. To start another game just press P1 to serve from left or P4 to serve from right. To play at a different speed you must start over again from P3.

BLEEP AGAINST THE MACHINE

Here's your chance to improve your reflexes when there's no-one around to play against. Simply push

P3 - 07 - P1 - SPEED CODE - P1 - P2

and any one of the keys 1, 4, 7, or 0. The computer will serve and play from the left side, and you will play from the right side, using keys numbered A, B, C, F. For the second serve and all following serves press A, B, C, or F, but continue to play the same keys. The game will continue until you have missed 9 shots. Good Luck!

Programmed Games

PART III

TO CATCH A THIEF

Use slide no. G.

In modern crime detection police officers have a powerful new ally in the computer. The descriptions of known criminals or suspects are kept in data banks, which are searched by the computer in order to identify those that might have committed a crime.

As soon as a crime is reported, a physical description of the criminal is fed into the computer. Based on this description, the computer is able to quickly name a series of men who answer to this description.

To find out how your T.E.A.M.M.A.T.E. Computer can help to identify and track down criminals assume that the right 2 columns of lamps portray 8 known criminals and the left 2 columns are their physical descriptions. Each criminal answers to a unique set of characteristics.

Now, to program your computer proceed as follows: Press

P3 - 04 - P1 - P2

The 4x4 matrix of lamps corresponds to the 4x4 matrix of keys from 1 to F. Therefore to light the lamp in the upper hand corner, you would press 1, the lower right hand corner, you would press F, as explained at the start of part I.

Let's assume that criminal No. 1, in the position corresponding to key 3 is fat, bald and over 30. We then press

3 - 1 - 0 - 5

and we see the lamps light up to show these characteristics. To enter this information into the computer press P1 - P2. The next criminal, key 6 is short and hairy, so we press

6 - 2 - D

and enter it by pressing P1 - P2

We continue this way for up to 8 known criminals corresponding to the keys 3, 6, 9, E, A, B, C and F and their unique set of physical descriptions. After the last criminal and his description, press

P1 - P2 - P1

To check if we have entered the correct descriptions press P4 for reverse and P1 for forward and you can step through all the information entered.

Now, suppose that someone has just held up the local candy store and the witnesses say he was over 30, bald, and fat. Let's see how we can make use of our T.E.A.M.M.A.T.E. computer to apprehend the criminal. Press

P3 - 0A - P1

and enter the witnesses' descriptions by pressing 0 - 5 - 1

To find out who fits this description press P4, and the computer tells us it is the criminal who corresponds to key 3.

Similarly, suppose that your bike was stolen by a thief answering the description short and hairy. To find out who he is press

P1 - 2 - D - P4

and the computer instantaneously identifies him as the criminal corresponding to key 6.

Police departments all over the world now use computers to store the descriptions of thousands of known criminals and are able to identify criminals in a fraction of a second. Previously this took weeks because it had to be done by sifting through thousands of files.

A word of caution when using your T.E.A.M.M.A.T.E. Computer to identify criminals. It will identify a criminal even if given one or more of his characteristics and it will show no one if given a set of characteristics that matches no one. Also, it will identify all criminals having a common characteristic. So make sure to enter all the characteristics that have been previously programmed.

THE COMPUTER BARTENDER

Use slide No. H.

Here is a program that would be equally useful, on a large scale, in a chemical factory and on a small scale, in a bar. A computer-barman is never too tired to remember the ingredients of a favorite cocktail. You can easily see how this program could be adopted under different circumstances to help automatic production in a pharmaceutical or other type of factory.

Instead of turning on a lamp as in our T.E.A.M.M.A.T.E. Computer, the wiring would be connected to switches that control the components of the assembly line or of a cocktail machine.

To program the ingredients of each drink into the computer press

P3 - 04 - P1 - P2

The right 2 columns of lamps and the right 2 columns of keys, i.e. 3, 6, 9, E, A, B, C and F correspond to the 8 ingredients. The left 2 columns and the left-hand keys 1, 4, 7, 0, 2, 5, 8 and D correspond to the drinks.

If, for example we wish the computer to know how to mix a Martini (gin and dry vermouth) we press 1 for martini and 3A for gin and dry vermouth

Then we press P1 - P2 to enter it into the computer.

Similarly a Side-Car (brandy, cointreau and lemon juice) in programmed by pressing

4 - 6 - B - 9 - P1 - P2

After entering the last mix, press

P1 - P2 - P1

Now, if we want the computer to tell us the ingredients of say a martini, we press

P3 - 0A - P1 and 1 - P4

and the lamps light up for gin and dry vermouth.

Similarly by pressing

P1 - 4 - P4

we get the recipe for a side-car.

If these lights were connected to valves which controlled the flow of the liquids we would have for example, a completely automatic bartender, or perfume factory, or soda fountain. Try to make up your own transparencies for cakes, breads, and chemicals, and any other process you can think of. Happy mixing!

Here's a good idea for some fun at your party. Program your T.E.A.M.M.A.T.E. computer with all the recipes for the cocktails shown on the transparency. Then ask your guests if they know the recipes and if they don't simply ask your T.E.A.M.M.A.T.E. Computer to tell you. In case you don't know some of the cocktail recipes, here is the complete program: (Also known as the Complete Computer Cookbook)

P3 - 04 - P1 - P2
1 - 3 - A - P1 - P2
4 - 6 - B - 9 - P1 - P2
7 - 3 - C - A - P1 - P2
0 - 6 - C - P1 - P2
2 - 3 - C - P1 - P2
5 - 6 - E - P1 - P2
8 - 6 - A - C - P1 - P2
D - 3 - F - P1 - P2 - P1

Then, to see what the recipe is for say, Side Car cocktail, simply press

P3 - OA - P1
4 - P4

of for a Bombay, press

P1 - 8 - P4, etc.

FROM COLORS TO LOGIC

Use slide No. I

Enter the following program:-

P3 - 04 - P1 - P2
1 - 4 - 3 - P1 - P2 .
1 - 4 - 7 - 6 - P1 - P2
4 - 7 - 9 - P1 - P2
1 - 7 - E - P1 - P2 - P1

Now, to find out which primary colors we have to mix to get secondary ones like orange, brown, violet and green, press

P3 - OA - P1	
1 - 4 - P4	for orange
P1 - 1 - 4 - 7 - P4	for brown
P1 - 4 - 7 - P4	for violet
P1 - 1 - 7 - P4	for green

The problem of mixing primary colors to produce secondary ones is a simple one; however, this program does teach us something about computers. We can see that the T.E.A.M.M.A.T.E. Computer works according to the laws of logic.

It can reach the conclusion that if you mix yellow and red, you come up with orange. To put this in a logical form: IF there is red AND it is mixed with yellow, THEN you will get orange.

This type of reasoning is not limited to mixing colors, but can also be applied to a wide variety of logical statements. For instance, IF it rains and I go out without my umbrella, THEN I will get wet.

This type of logical problem solving can be easily done on your T.E.A.M.M.A.T.E. Computer by using some of the blank slides supplied.

AN ELEMENTARY CALCULATOR

- use Slide J

Enter the following program;

P3 - 04 - P1 - P2
1 - 4 - 3 - P1 - P2
4 - 7 - 6 - P1 - P2
7 - 0 - 9 - P1 - P2
2 - 5 - A - P1 - P2
2 - D - 5 - P1 - P2
8 - D - C - P1 - P2
0 - D - E - P1 - P2 - P1

Now ask your friends to solve the problems which are indicated on the left hand side of the Slide. They are;

Problem No. 1: 5 x Pi =
2: Pi x Pi =
3: Pi + 8 =
4: $\sqrt{9}$ =
5: 45÷9 =
6: 45+45 =
7: 8 x 45 =

To get the answers, press

P3 - 0A - P1	
1 - 4 - P4	for no. 1
P1 - 4 - 7 - P4	for no. 2
P1 - 7 - 0 - P4	for no. 3
P1 - 2 - 5 - P4	for no. 4
P1 - 2 - D - P4	for no. 5
P1 - 8 - D - P4	for no. 6
P1 - 0 - D - P4	for no. 7

You could even say that it has memory since it remembered all the instructions which you programmed it with. In fact, your T.E.A.M.M.A.T.E. Computer has considerably more memory than a typical calculator, as you will learn about later on.

MUSICAL CHORDS

Use slide No. K

Here is a program which will help us learn musical harmony. We will program the T.E.A.M.M.A.T.E. computer to identify the notes of a triad (chord of three notes) and the computer will indicate which triad (if correct) has been selected. Notice the way the chords have been arranged on the right hand side of the transparency. As you may know from your music lessons, each major chord has what is known as a relative minor. Thus, the relative minor of C Major (C, E, G) is A minor (A, C, E). The relative minor chord of F Major (F, C, A) is D Minor (D, F, A). The relative minor of G Major (D, G, B) is E Minor (E, G, B), and the relative minor of D Major (D, F sharp, A) is B Minor (B, D, F sharp). Incidentally, a relative minor is not your baby cousin. To program the musical chords, press

P3 - 04 - P1 - P2	
1 - 5 - 0 - 3 - P1 - P2	F Major
4 - 0 - 5 - 6 - P1 - P2	D Minor
1 - 7 - 8 - 9 - P1 - P2	C Major
1 - 7 - 5 - E - P1 - P2	A Minor
4 - 2 - 8 - A - P1 - P2	G Major
7 - 8 - 2 - B - P1 - P2	E Minor
4 - 5 - D - C - P1 - P2	D Major
4 - 2 - D - F - P1 - P2 - P1	B Minor

Now, to find if you can identify the correct notes which make up a chord press

P3 - 0A - P1

and the 3 keys corresponding to the chord and P4. If you are right the lamp for the chord will light. If you've made a mistake no chord will light. No cheating though, you must press three notes, since if you press only 2 your T.E.A.M.M.A.T.E. computer will indicate all the chords which have those 2 notes.

As an example, suppose you want to know if C, F, A are the notes for F Major (key 3). Press

1 - 0 - 5 - P4

and notice that the lamp corresponding to F Major is lit. Now, if you want to know if D, F sharp, A is D Major, press
P1 - 4 - D - 5 - P4

If you try P1 - 4 - D - 8 the computer does not light any lamp since no chord has been programmed with these notes. You can continue to try and identify all the chords programmed and also try to program your own chords on the blank slides. Don't forget to press P1 before the notes when you try to identify the correct notes. A simple rule to remember is this: When programming, P1 comes after, when recalling the program, as in the OA routine, P1 always comes before.

THE COMPUTER DETECTIVE

use Slide No. L

We will now use our T.E.A.M.M.A.T.E. computer to play detective. Following certain clues which we will feed into it, it will solve a case with the skill of a Sherlock Holmes.

You are all familiar with the old puzzle which goes something like this: Mr. Smith, Mr. Jones and Mr. Davis are three residents of a small town, who like to meet frequently in a local restaurant. One of the three is the mayor of the town, the other is a druggist, and the third is the doctor. The question is: "What is the profession of each of these three men?"

Before you start to figure this out, we will give you three clues:
1) Mr. Smith and the doctor often like to tell little stories to each other.
2) Mr. Jones and the druggist often play chess with each other.
3) The doctor and Mr. Jones frequently like to argue with each other about various questions.

Now let's feed these clues into the computer and solve the puzzle. But first let's make up a table of possibilities which will clarify the clues. The table is shown in the figure and is really simple. A tick means that the person could be that profession. For example clue -1 says that Mr. Smith could be the druggist, or the mayor but not the doctor. So we put a tick for Mayor and Druggist. Notice also, that on the slide we have changed this table slightly in that we have put the professions up and down rather than across. This is because your T.E.A.M.M.A.T.E. computer likes to get his information that way. Maybe he had a Chinese grandfather.

	Mayor	Druggist	Doctor	Clue
Mr. Smith	x	x		-1
Mr. Jones	x		x	-2
Mr. Davis	x	x	x	
Mr. Jones	x	x		-3

To program these clues in, press

P3 - 04 - P1 - P2

To enter clue -1 press 1- 3 - 6 - P1 - P2

clue -2 4 - 3 - 9 - P1 - P2
clue -3 7 - 3 - 6 - 9 - P1 - P2
clue -4 4 - 3 - 6 - P1 - P2 - P1

In other words we have pressed the keys which are ticked and we have assigned keys 1, 4, 7 to Mr. Smith, Mr. Jones and Mr. Davis respectively as in the table. We also pressed P1 last to tell the computer that there are no more clues. Now press

P3 - 0B - P1

and ask the computer one person at a time for the answer. First, Mr. Smith. Press
1 - P4

The computer still does not know since it indicates that Mr. Smith could either be the druggist or the mayor.

Try Mr. Jones

P1 - 4 - P4

and we have a solution. The computer says he is the mayor. Knowing this we can go back and change the table. The new table now looks like this:

	MAYOR	DRUGGIST	DOCTOR
Mr. Smith		x	
Mr. Jones	x		
Mr. Davis			x
Mr. Jones	x		

Although the solution now seems obvious let's go through it anyway in order to learn how to do more complex problems.

Correct the clues which are entered in the computer according to the new table. Press

P3 - 04 - P1 - P2
1 - 6 - P1 - P2
4 - 3 - P1 - P2
7 - 6 - 9 - P1 - P2
4 - 3 - P1 - P2

Now press

P3 - 0B - P1

and the solutions pop out

1 - P4
P1 - 4 - P4
P1 - 7 - P4

Mr. Smith is the Druggist
Mr. Jones is the Mayor
and Mr. Davis is the Doctor

DOCTOR LOGIX

Use slide No. M

Your T.E.A.M.M.A.T.E. computer has now changed its profession. Imagine it in a white uniform with a stethoscope around its neck. With new program, you can instantly change your T.E.A.M.M.A.T.E. computer into a medical doctor.

Your T.E.A.M.M.A.T.E. computer will patiently listen to you as you complain of all your aches and pains. It will give you a medical name for your illnesses.

Enter the following program into the computer:

P3 - 04 - P1 - P2
2 - 0 - A - P1 - P2
4 - 2 - B - P1 - P2
7 - C - P1 - P2
4 - 7 - 0 - 2 - F - P1 - P2 - P1

Now to get the computer's diagnosis of your symptoms press

```
P3 - 0A - P1
2 - 0 - P4
```

if you have backpains and fever;

```
P1 - 4 - 2 - P4
```

if you have cough and fever;

```
P1 - 7 - P4
```

for nausea;

```
P1 - 4 - 7 - 0 - 2 - P4
```

and for cough, nausea, backpains and fever.

Today there are large electronic computers that are programmed to give accurate medical diagnoses. They consider all the patient's symptons: temperature, pulse, heartbeat, breathing, his pains and other symptoms; and immediately indicate the suspected disease, and propose remedies and medications according to the most advanced medical literature. These large computers reach there conclusions basically in the same way our T.E.A.M.M.A.T.E. computer does, except that their branching possibilities are thousands of times more complicated and they are instantly able to use an entire medical library that has been fed into them.

In medicine, the practical value of the computer is that it can learn tens of thousands of combinations of symptoms and thousands of diagnoses. The computer is programmed according to the diagnoses of the best medical specialists. It is carefully tested, and any mistakes that are found are corrected. Obviously, these electronic machines can never compare to or replace a real doctor. What they actually do is to put a good doctor on the right track when dealing with a very complicated set of symptoms. Instead of searching for hours, or maybe even days, the computer can lead him very rapidly towards the most likely answer.

FROM LA PAZ TO BUENOS AIRES

Use slide No. N

How do you find your way in a part of the world that you have never visited before? Your T.E.A.M.M.A.T.E. Computer can help you. Suppose you have to find your way from La Pax in Bolivia to Buenos Aires in Argentina. The question is: through which cities will you be able to reach your destination fastest?

Enter the following program:

```
P3 - 04 - P1 - P2
1 - 7 - 2 - 3 - P1 - P2
4 - 7 - 5 - 6 - B - P1 - P2
0 - 8 - 1 - F - C - P1 - P2 - P1
```

Now press

```
P3 - 0A - P1
```

and any three cities followed by P4. If you have picked the right three your T.E.A.M.M.A.T.E. Computer will light the lamps around Buenos Aires. If your choice is wrong press P1 and try 3 cities again. Happy travelling!

A TRANSLATING MACHINE

Use slide No. O

If every language had the same grammar rules, it would be an easy thing to make a translating computer. Then it would be only a matter of matching the word in one language to the corresponding word in another language. The problem of translation by machine is that languages are very changeable in their grammar.

This program will illustrate this in a translation from English to French.

To show you some of the difficulties, we must tell you a little about the French language. This will show you the problems that a computer expert will face in trying to design a translating program.

Take the word "the" in English. In French it may be translated by either of two words: "le" or "la", depending on whether the word it goes with is masculine or feminine. "Garçon" is masculine, so when you want to say "the boy", you say "le garçon". "Fille" in French - girl - is feminine and so if you want to say "the girl" you must say "la fille". In order to translate properly from English to French, the translating machine must know this distinction. It must be able to chose "le" or "la" just as someone learning the language must do. You will notice in this program that our T.E.A.M.M.A.T.E. Computer actually does make this choice without error.

Here is another problem. Sometimes where we use the same word for two different things in English, another language may use two words. Take, for example, the word "rings". In English, we would use exactly the same word for the sentence "The girl has many rings", in which the word "rings" is a noun and the sentence "The boy rings the bell". In French, however, the two uses of "rings" refers to an object, something you wear on your finger, the French would use the word "bague". In order to translate efficiently from English to French, your T.E.A.M.M.A.T.E. Computer must be able to distinguish between the two uses of the word "ring". In fact, it actually can do this. If you experiment with this program and set up the two different sentences, you will see that your computer will choose the right form of the word "rings" to translate the two uses of the English word.

Although computers can match a word in one language to that of another and can even follow grammatical rules, they can never achieve a really natural translation from one language to another. For instance, one machine when translating a Biblical text from Greek into English translated "The spirit is strong but the flesh is weak", as "The wiskey is well-recommended but the meat isn't very good". This anecdote is not meant to convince you that our computer's translations are this bad. However, very strange interpretations of the foreign language often emerge; these might be acceptable for translating a scientific text but hardly for translating a novel or a poem.

Enter the following program;

```
P3 - 04 - P1 - P2
1 - 4 - 3 - 9 - P1 - P2
1 - 7 - 6 - E - P1 - P2
1 - 4 - 5 - 8 - D - 3 - 9 - C - F - P1 - P2
1 - 7 - 0 - 2 - 5 - 6 - E - A - B - P1 - P2
8 - D - F - P1 - P2
0 - 2 - A - P1 - P2 - P1
```

and see if it can translate the following phrases and sentences:

```
P3 - 0A - P1 - P2
```

The boy : P1 - 1 - 4 - P4
The girl— P1 - 1 - 7 - P1
has many: P1 - 0 - 2 - P4
The bell: P1 - 8 - D - P4
The boy rings the bell: P1 - 1 - 4 - 5 - 8 - 9 - P4
The girl has many rings: P1 - 1 - 7 - 0 - 2 - 5 - P4

A KNOWLEDGE TEST

Use slide No. P

Here is a knowledge test you can give your relatives and friends. Prepare a list of 4 fairly difficult questions in such a way that each is given a choice of 2 answers. A suggested list is given below. As you can see, the "code" for right answers is:

X	Y
○	⊗
○	⊗
○	⊗
⊗	○

SUGGESTED QUESTIONS:

	X	Y
1. When did Columbus discover America?	1066	1492
2. What is the population of the United States?	450 million	230 million
3. Who invented the telephone?	Morse	Bell
4. What is the capital of Argentina?	Buenos Aires	La Pas

To program the computer proceed as follows:

```
P3 - 04 - P1 - P2
0 - 2 - 5 - 8 - 3 - P1 - P2
1 - 4 - 8 - D - 6 - P1 - P2
2 - 4 - 8 - 0 - 9 - P1 - P2
```

```
1 - 4 - 7 - D - E - P1 - P2
2 - 5 - 7 - 0 - F - P1 - P2 - P1
```

Then press the keys according to the answers given and find your score. Don't forget to press

```
P3 - 0A - P1
```

before the answers followed by P4. Thus, if your knew all the correct answers you would press

```
P3 - 0A - P1
2 - 5 - 8 - 0 - P4
```

A NUMBERS GAME

Use slide No. Q

Now that you are familiar with programming your T.E.A.M.M.A.T.E. Computer, using the 04 to enter and 0A to replay, we will introduce you to a simple numbers game that you can play with your friend.

The game goes like this: You program the computer using 2 keys on the left hand columns (keys 1, 4, 7, 0, 2, 5, 8, D) for every key on the right hand column (key 3, 6, 9, E, A, B, C, F). Thus, a sample program may be:

```
P3 - 04 - P1 - P2
1 - 5 - 3 - P1 - P2
4 - 2 - 6 - P1 - P2
7 - 8 - 9 - P1 - P2
0 - D - E - P1 - P2
1 - 8 - A - P1 - P2
2 - D - B - P1 - P2
7 - 2 - C - P1 - P2
0 - 5 - F - P1 - P2
```

This means that you have assigned a score of 5 for keys 1-5, a score of 10 for keys 4-2, a score of 15 for keys 7-8 etc. Of course you don't show him your program. Now press

```
P3 - 0A - P1
```

and ask him to enter any 2 keys on the left hand columns followed by P4. To try again, press P1, enter 2 keys and press P4. Give him 3 tries and total up his score. Now ask him to re-program the T.E.A.M.M.A.T.E. Computer the same way we have outlined above and take your turn. The winner is the one with the highest number of points.

If you want a greater challenge, try using 3 numbers instead of 2. But remember you must also use 3 keys when you try for the numbers.

WHEEL OF FORTUNE [BEGINNERS]

Use slide No. R

Step right up, ladies and gentlemen and try your hand at a computerized Wheel of Fortune.

First, enter the following program:

```
P3 - 03 - P1

1 - 1 - P1
1 - 2 - P1
1 - 3 - P1
1 - 4 - P1
1 - 5 - P1
1 - 6 - P1
1 - 7 - P1
1 - 8 - P1
1 - 9 - P1
1 - A - P1
1 - B - P1
1 - C - P1
1 - D - P1
1 - E - P1
1 - F - P1
0 - 0 - P1
P3 - 05
```

To start the wheel rolling press P1.

To stop it press P3 and hold it down and watch your lucky number light up on the slide. To start the wheel rolling again, press P1 to start and P3 to stop. Good Luck!

A COMPUTER WEATHER FORECAST

Use slide No. S

Mark Twain once said: "Everybody talks about the weather, but nobody does anything about it". Your T.E.A.M.M.A.T.E. Computer cannot do much about the weather either, but it can show you something about the way larger computers are used today to predict the weather with a fair degree of accuracy.

In this program we use 2 factors, or as they are called by professional weathermen, variables, to make an elementary weather prediction: air pressure and wind direction.

You can easily find out the facts you need for these variables. Air pressure is measured with an instrument called a barometer. If you do not own one you can find out the day-to-day readings from your local radio station or weather office. Similarly, wind direction is measured with a weather vane and may be obtained from the sources mentioned above.

Of course, you must realise that with only 2 variables, your predictions will not be as accurate as the ones made by professional weathermen with hundreds of variables and large computers. But are they always right?

Our program can predict weather for the following conditions:

1) Barometer rising and wind from west or northwest
2) Barometer falling and wind from southwest
3) Barometer falling and wind from southeast
4) Barometer rising and wind from north

Here is the program:

```
P3 - 04 - P1 - P2
1 - 4 - A - P1 - P2
1 - 7 - A - P1 - P2
2 - 0 - B - P1 - P2
2 - D - C - P1 - P2
1 - 5 - F - P1 - P2 - P1
```

To see what the weather will be like, enter the variables as follows:

```
For Condition 1,        P3 - 0A - P1
                        1 - 4 - P4
                   or   1 - 7 - P4
For Condition 2,        P3 - 0A - P1
                        2 - 0 - P4
For Condition 3,        P3 - 0A - P1
                        2 - D - P4
For Condition 4,        P3 - 0A - P1
                        1 - 5 - P4
```

Try to predict the weather using your T.E.A.M.M.A.T.E. Computer for a number of days and see who is right more often - you or the weatherman on the radio.

MINI CHECKERS

Use slide No. C.

Would you like to play a game of mini-checkers on your T.E.A.M.M.A.T.E. Computer? The rules have been changed slightly but the idea is the same. For this program we use the 4x4 array of lamps as the checkerboard, and we allow 4 checker pieces per side. To distinguish the opposing teams, one side flashes and one side has a steady light.

To set up the pieces, press

```
P3 - 0D - P1
1 - 4 - 7 - 0
P4 - A - B - C - F
```

The rules of mini- checkers are as follows:

1) pieces can move only diagonally
2) pieces can be "jumped" and taken off when they are diagonally opposite each other
3) when you get a chance to "jump" you must do it.
4) the winner is the one with the most pieces on the opposite side.
5) the 4x4 array of keys 1, 4, 7, 0, 2, 5, 8, D, 3, 6, 9, E, A, B, C, and F correspond to the 4x4 array of lamps such that 1 controls the upper left hand corner lamp, 0 controls the lower left hand corner

lamp, A controls the upper right hand corner lamp and F controls the lower right hand corner lamp.

Now suppose that you move first and you are on the left. Press P1 and the numerical readouts should read E0. To move a piece, say, 1 to 5, press 1 to make the lamp go out and press 5 to make it go on at position 5. The lamps will go on and off each time the keys are pressed. Now it is your opponent's turn. He presses P4 and the readout changes to 0E. Now suppose he wants to move F to 9. He presses F and 9. The piece is now at 9. Continue until no more moves are possible, and the player with the most pieces on the opposite side wins.

NIM

Use slide No. B

This ancient game, probably played by the Chinese before chess or checkers, has many variations. One of them goes as follows.

Divide the 16 lamps into 3 groups - a group of 1, a group of 5 and a group of 10, as shown in the figure. The object is to turn off the last lamp. Each play consists of turning off from any one group any number of lamps.

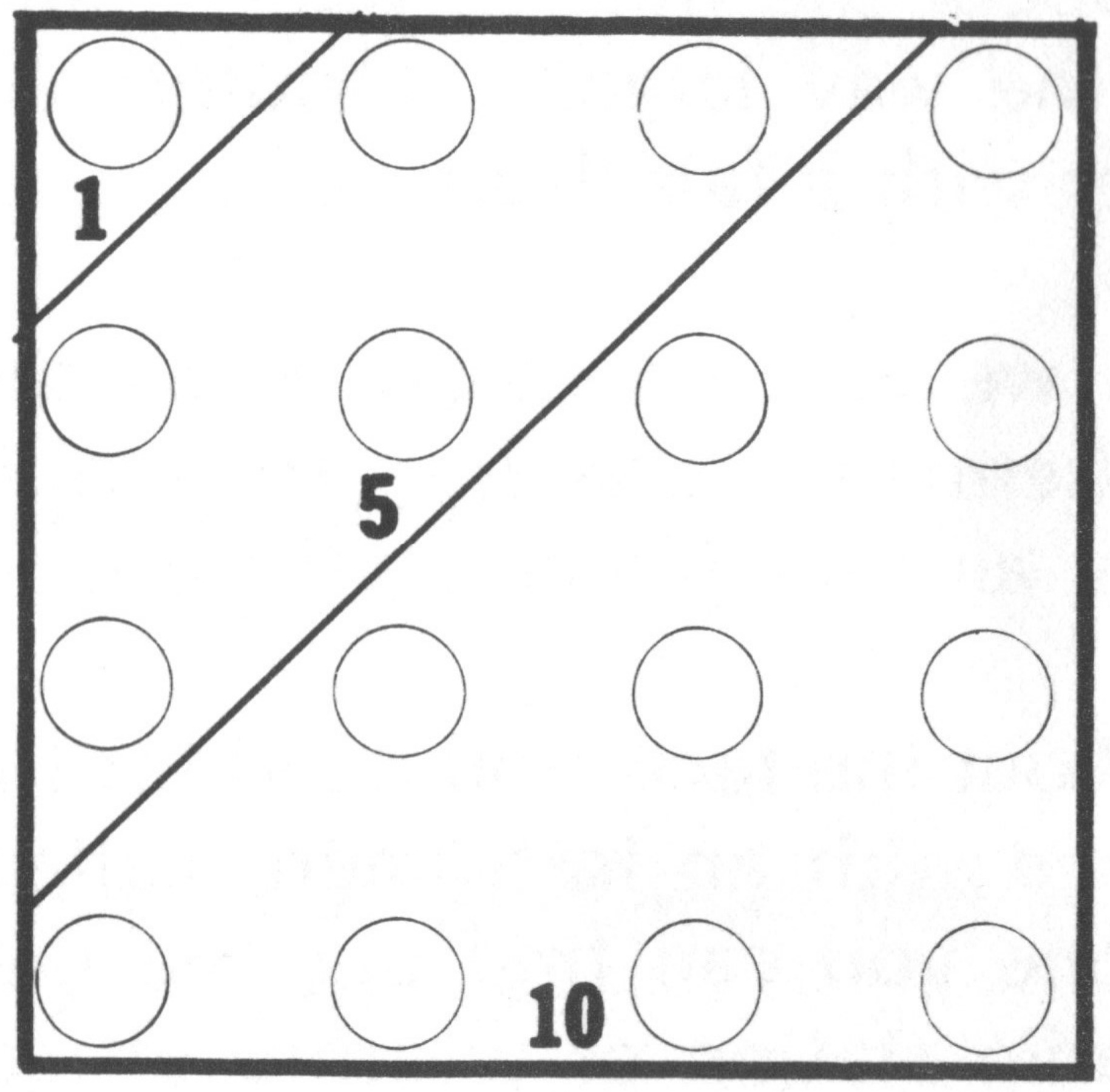
The game starts with all lamps lit. You move first and you have 16 choices: Turn off 1 lamp from the group of 1; or turn off 1, 2 ....up to 5 in the group of 5; or turn off 1, 2....up to 10 lamps in the group of 10. Remember that you can turn off lamps from only one group on your turn. After you have moved, it's your opponent's turn. The game continues until the last lamp is turned off, and the one who turns off the last lamp loses.

To program the computer press

```
P3 - 0D - P1
1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
9 - A - B - C - D - E - F
```

To turn off the lamps, simply press the key corresponding to that lamp. If you've made a mistake, press it again and it will turn on.

Here's the secret for a winning strategy: NIM has been analyzed by computer experts and programs have been written for it using large computers. The trick is to separate each group into powers of 2. Thus the groups now are 1, 1+4, 2 +8. Then you turn off lamps such that your opponent is left with an even number of powers of 2. For example, your first move could turn off 6 lamps from the 8, leaving your opponent with 1, 1 + 4, 4. This is 2 separations of powers of 2. Remember that 2, 4 and 8 are powers of 2.



WHEEL OF FORTUNE [Advanced]

Use slide No. R

If you find the previous WHEEL OF FORTUNE too easy try this one. Press

```
P3 - 03 - P1
1 - 1 - P1
1 - 3 - P1
1 - 5 - P1
1 - 2 - P1
1 - 4 - P1
1 - 6 - P1
1 - 3 - P1
1 - 5 - P1
1 - 7 - P1
1 - 4 - P1
1 - 6 - P1
1 - 9 - P1
1 - 5 - P1
1 - 7 - P1
1 - A - P1
1 - 6 - P1
1 - 9 - P1
1 - B - P1
```

1 - 7 - P1
1 - A - P1
1 - C - P1
1 - 9 - P1
1 - B - P1
1 - D - P1
1 - C - P1
1 - E - P1
1 - E - P1
1 - B - P1
1 - D - P1
1 - F - P1
0 - 0 - P1
P3 - 05

Follow the same rules as before, or shoot for one definite score. Let's pick a goal, for instance of 2500 points. Each player will take alternate turns, and keep track of his own score, while trying to hit the goal of 2500 points. The first person to reach 2500 points exactly is the winner. If by chance a player should go over the goal, he is penalized and must start over at 0 points. This version of Wheel of Fortune is much harder, but you should find it much more challenging. Have Fun!

CONCLUSION
NOW IT'S YOUR TURN

We will be very happy to answer any questions you have about the operation of your T.E.A.M.M.A.T.E. Game Computer. In addition, if you devise any new and original games or interesting puzzles, send them in to us and they will be published in future issues of this manual with full credit shown.

NOTES